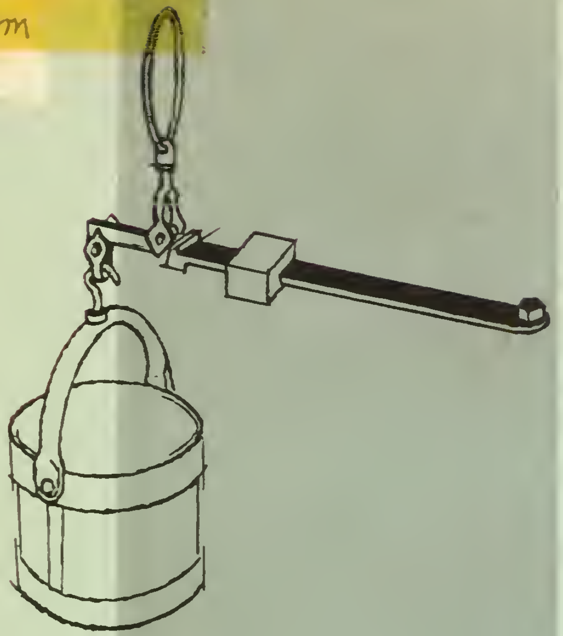
Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

A280.39
M34Am
Cop. 3

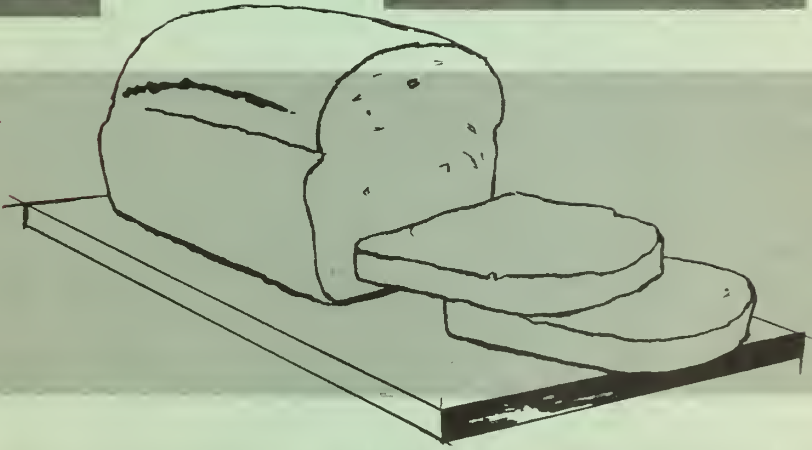
December 1959
AMS-356



LIBRARY
CURRENT SERIAL RECORD
★ JAN 14 1960 ★
U. S. DEPARTMENT OF AGRICULTURE

Physical, Chemical, Milling, and Baking Properties of Carlot Receipts of Wheat

1958 CROP



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service Grain Division

Preface

Each year, beginning in 1939, the Grain Division, AMS, has been collecting data on the physical, chemical, milling, and baking properties of wheat samples representing carlot receipts which were composited by grade at different markets. These samples were collected during the first 90 days of the crop movement. Beginning with the crop year 1947, reports have been issued for each year for administrative use only. In addition, in 1953 a summary of the data for the crop years 1939 through 1952, which showed the averages for each year, was issued.

From time to time interested parties outside of the Department of Agriculture have requested this information. It now seems advisable to give these reports wider circulation by making them available to interested parties outside the Department. A limited number of the reports of recent years will also be available for distribution.

This report is based on the results of studies conducted by the Standardization and Testing Branch under the direction of Lawrence Zeleny, Chief; W. H. Hosterman, Assistant Chief; and M. H. Neustadt, Head, Standardization Section. Milling and baking work was done by Clemmer Marcus, Tyler F. Hartsing, C. C. Fifield, Georgia M. Gurney, and Reba E. Renn. Chemical analyses were performed by the Testing Section, Harry B. Dixon, Head.

Without the assistance of the various Field Offices of the Grain Division, which furnished the samples and graded them, this study would not have been possible.

The mention of trade products in this report does not imply that they are endorsed or recommended by the Department of Agriculture over other products not mentioned.

WHEAT - PROPERTIES OF RECEIPTS - 1958 CROP

GSR Project 47

The 124 samples for which data are given in this report represent composites of 22,040 commercial carlot receipts of wheat of the 1958 crop which were collected by the designated district offices and segregated according to subclass and grade.

The tests used in this study and their significance are explained as follows:

Ash. Ash content is expressed on a 14.0-percent moisture basis for both wheat and flour. The ash content of flour is a well-recognized but not precise measure of flour refinement. Generally the more bran that is in the flour the higher the ash content.

Protein. Protein content is determined by the standard Kjeldahl procedure using the factor 5.7. Values are reported on a 14.0 percent moisture basis.

Fat acidity. Fat acidity is an index of soundness and is defined as the number of milligrams of potassium hydroxide required to neutralize the free fatty acids present in 100 grams of wheat, expressed on a moisture-free basis. Freshly harvested wheat of unquestionable soundness nearly always has fat acidity values of less than 20. Badly deteriorated wheat may have fat acidity values of over 100.

Sedimentation Value (Wheat). Determined by the method described in Cereal Laboratory Methods, Sixth Edition (1957). Values are reported on a 14.0 percent moisture basis. The sedimentation value is a combined index of gluten content and gluten quality and is therefore a rough measure of bread-baking strength. High sedimentation values are normally associated with superior bread-baking strength.

Pearling Index. The pearling index is the percentage of wheat pearled off in 1 minute when 20 grams of wheat are pearled in a No. 38 Strong-Scott Pearler. The harder the grain, the lower the percentage.

Milling Yield. Flour or semolina yield is the percentage of flour or semolina derived respectively from wheat or durum wheat under the laboratory milling conditions employed. Yields are expressed on a moisture-free basis.

Milling Score. The milling score is a mathematical expression involving many factors. It is calculated from the equation:

$$\begin{aligned} \text{Milling score} = 100 - \Big[&(80 - \%\ \text{yield}) + 50\ (\%\ \text{ash} - .30) \\ &+ .04\ (160 - \text{feed rate (g/min.)} \\ &+ .2\ (65 - \%\ \text{patent}) \\ &+ .5\ (16 - \%\ \text{milling moisture})\Big] \end{aligned}$$

Mixogram Characteristics. Mixogram curves made on a National recording micro mixer (Mixograph) can be used to evaluate dough-mixing characteristics. In this report the development time and the mixing tolerance are included. The development time is defined as the time required for maximum dough development (the peak of the curve). The time during which the dough maintains its stability without appreciable change in the height of the curve is the mixing tolerance.

Mixing Time. The optimum time necessary to obtain a dough of maximum consistency in the bread-making process.

Water Absorption. The optimum amount of water required to bring the dough to the desired standard consistency in the bread-making process.

Bread Loaf Volume. The maximum volume obtainable by using a baking formula which in addition to the basic ingredients included shortening, malted wheat flour, nonfat dry milk, and the optimum amount of potassium bromate. These values are somewhat higher than those reported prior to 1956 because of the substitution of a new type of baking pan.

Expected Loaf Volume. This value is based on flour protein content and is the loaf volume obtained from baking experiments in which the flour from 589 samples of hard red spring wheat varieties for the crop years 1944 to 1947 were used. These values have been corrected for the new type of baking pan adopted beginning with the 1956 crop.

Crumb Color, Grain and Texture. The score used in judging crumb color, grain and texture is based on a visual examination of the loaf of bread and the following table is used in recording the results:

59 or below	Very poor or unsatisfactory
60 to 69	Poor or questionable
70 to 79	Fair
80 to 89	Good
90 to 99	Very good
100 and above	Excellent

Cooky Factor. The cooky factor is used to evaluate the quality of Soft Red Winter Wheat, Yellow Hard Winter Wheat, and White Wheat and is determined by dividing the average diameter of the cookies by their average thickness.

Carotenoid Content. The carotenoid content is used to evaluate durum wheat and semolina. Water-saturated butyl alcohol is used to extract the pigments and the color is expressed as the carotene equivalent. Macaroni color depends largely on carotenoid content and lipoxidase value.

Visual Appearance and Numerical Rating. The macaroni is also evaluated by visual color comparisons. The appearance to the observer is described by adjective rating and numerically. The best is rated 1 and the poorest 6.

Averages. Averages shown are weighted averages, that is, the number of carlots in each sample is considered in computing the average for all samples in the grade of wheat.

GSR PROJECT NO. 47 - 1958 CROP

HARD RED WINTER WHEAT

Grade	No. 1 Dark Hard Winter				
District	Enid	Fort Worth	Kansas City	Minneapolis	Ogden
No. of carlots composited	205	29	487	64	102
WHEAT:					
Test weight per bushel, lbs.	61.8	61.7	61.2	62.4	62.2
Weight per 1000 kernels, gms.	27.0	27.3	27.4	29.6	32.5
Damaged kernels, pct.	0.0	0.0	trace	trace	0.0
Dark, hard, and vitreous kernels, pct.	85.0	82.0	81.0	84.0	86.0
Ash, pct.	1.65	1.58	1.63	1.46	1.44
Protein, pct.	13.6	13.4	13.1	13.0	11.5
Fat acidity	7	11	10	8	10
Sedimentation value	42	36	40	45	39
Pearling index	26	25	29	33	27
Flour yield, pct.	72.1	75.1	74.8	75.9	74.8
Milling score	78.0	85.4	81.0	87.3	85.5
FLOUR:					
Ash, pct.	.50	.47	.51	.44	.44
Protein, pct.	12.8	12.1	12.0	12.0	10.5
Mixing time, min.	2.25	2.00	2.00	1.50	2.25
Water absorption, pct.	57	61	57	61	60
Mixogram characteristics:					
Development time, min.	2.50	2.50	2.50	2.00	2.50
Mixing tolerance, min.	1.25	1.00	1.50	1.00	1.25
BREAD:					
Loaf volume, ml.	790	855	788	785	755
Expected loaf volume, ml.	845	810	805	805	730
Grain and texture	85	95	80	95	85
Crumb color	80	85	75	70	75

(continued)

HARD RED WINTER WHEAT (cont.)

Grade	No. 1 Dark Hard Winter (cont.)			
District	Omaha	Portland	Wichita	Average
No. of carlots composited (Total No. - 1162)	66	174	35	
WHEAT:				
Test weight per bushel, lbs.	61.4	63.4	61.3	61.8
Weight per 1000 kernels, gms.	29.5	31.4	26.9	29.2
Damaged kernels, pct.	trace	0.3	0.2	.05
Dark, hard, and vitreous kernels, pct.	78.0	88.0	86.0	83.4
Ash, pct.	1.56	1.45	1.69	1.58
Protein, pct.	12.9	12.0	13.2	12.9
Fat acidity	16	11	13	10
Sedimentation value	43	33	39	40
Pearling index	31	30	28	28
Flour yield, pct.	75.0	74.0	73.0	74.4
Milling score	86.8	85.8	83.1	82.4
FLOUR:				
Ash, pct.	.42	.41	.46	.48
Protein, pct.	11.4	10.9	12.1	11.8
Mixing time, min.	2.25	1.75	2.25	2.02
Water absorption, pct.	59	59	55	58
Mixogram characteristics:				
Development time, min.	2.75	2.25	2.75	2.45
Mixing tolerance, min.	1.50	1.00	1.75	1.32
BREAD:				
Loaf volume, ml.	820	780	795	788
Expected loaf volume, ml.	775	750	810	795
Grain and texture	90	90	90	85
Crumb color	80	80	75	77

HARD RED WINTER WHEAT (cont.)

Grade	No. 2 Dark Hard Winter					
District	Fort Worth	Kansas City	Minneapolis	Omaha	Wichita	Ave.
No. of carlots composited (Total No. - 327)	19	236	21	23	28	
WHEAT:						
Test weight per bushel, lbs.	58.8	59.3	60.5	59.5	59.0	59.4
Weight per 1000 kernels, gms.	22.7	26.6	29.1	27.3	25.1	26.5
Damaged kernels, pct.	0.0	trace	0.6	0.9	trace	0.1
Dark, hard, and vitreous kernels, pct.	80.0	75.0	82.0	75.0	76.0	75.8
Ash, pct.	1.79	1.66	1.55	1.65	1.71	1.66
Protein, pct.	14.1	13.9	12.7	13.2	13.8	13.8
Fat acidity	10	15	9	19	11	15
Sedimentation value	42	40	41	42	46	41
Pearling index	25	30	33	34	28	30
Flour yield, pct.	73.2	74.6	75.1	75.9	72.4	74.5
Milling score	82.7	79.7	85.4	85.5	81.2	80.8
FLOUR:						
Ash, pct.	.48	.53	.46	.46	.48	.51
Protein, pct.	13.0	13.1	11.8	12.0	12.5	12.9
Mixing time, min.	2.25	2.00	2.00	2.00	2.50	2.02
Water absorption, pct.	61	57	61	58	57	58
Mixogram characteristics:						
Development time, min.	2.75	3.00	2.50	2.75	3.25	2.95
Mixing tolerance, min.	1.25	1.25	1.25	1.50	1.50	1.27
BREAD:						
Loaf volume, ml.	868	843	785	855	815	839
Expected loaf volume, ml.	865	860	795	805	830	850
Grain and texture	90	90	95	95	90	90
Crumb color	85	85	75	80	75	83

HARD RED WINTER WHEAT (cont.)

Grade	No. 3 Dark Hard Winter		
District	Kansas City	Wichita	Average
No. of carlots composited (Total, 59)	48	11	
WHEAT:			
Test weight per bushel, lbs.	57.3	57.0	57.2
Weight per 1000 kernels, gms.	23.5	23.4	23.5
Damaged kernels, pct.	0.3	0.3	0.3
Dark, hard, and vitreous kernels, pct.	79.0	80.0	79.2
Ash, pct.	1.70	1.83	1.72
Protein, pct.	14.7	14.9	14.7
Fat acidity	14	12	14
Sedimentation value	51	54	52
Pearling index	30	28	29
Flour yield, pct.	72.6	71.7	72.4
Milling score	78.0	79.3	78.2
FLOUR:			
Ash, pct.	.52	.49	.51
Protein, pct.	13.8	13.5	13.7
Mixing time, min.	2.25	2.75	2.34
Water absorption, pct.	57	57	57
Mixogram characteristics:			
Development time, min.	2.75	3.25	2.84
Mixing tolerance, min.	1.25	1.25	1.25
BREAD:			
Loaf volume, ml.	833	845	835
Expected loaf volume, ml.	895	880	890
Grain and texture	90	85	89
Crumb color	80	80	80

HARD RED WINTER WHEAT (cont.)

Grade	No. 1 Hard Winter				
District	Chicago	Enid	Fort Worth	Kansas City	Ogden
No. of carlots composited	88	235	72	3713	70
WHEAT:					
Test weight per bushel, lbs.	60.7	62.4	60.8	61.2	62.8
Weight per 1000 kernels, gms.	28.9	28.1	26.5	29.6	33.5
Damaged kernels, pct.	1.3	trace	trace	0.0	0.0
Dark, hard, and vitreous kernels, pct.	44.0	57.2	64.0	48.0	70.0
Ash, pct.	1.52	1.56	1.55	1.62	1.49
Protein, pct.	11.4	11.1	11.9	11.2	10.2
Fat acidity	20	8	11	11	11
Sedimentation value	28	33	32	35	31
Pearling index	30	26	26	29	27
Flour yield, pct.	76.3	74.1	74.8	72.9	75.0
Milling score	88.6	83.3	86.2	82.1	84.4
FLOUR:					
Ash, pct.	.42	.46	.43	.48	.46
Protein, pct.	10.3	10.2	10.8	10.3	9.3
Mixing time, min.	2.25	1.75	2.00	2.25	2.25
Water absorption, pct.	58	56	59	57	61
Mixogram characteristics:					
Development time, min.	2.50	3.00	2.75	3.25	2.50
Mixing tolerance, min.	1.50	1.25	1.50	1.25	1.75
BREAD:					
Loaf volume, ml.	755	745	813	753	698
Expected loaf volume, ml.	720	715	745	720	670
Grain and texture	90	90	90	80	80
Crumb color	75	75	80	85	70

(continued)

HARD RED WINTER WHEAT (cont.)

Grade	No. 1 Hard Winter (cont.)			
District	Peoria	Portland	Wichita	Average
No. of carlots composited (Total No. - 4496)	77	36	205	
WHEAT:				
Test weight per bushel, lbs.	61.4	63.0	62.2	61.3
Weight per 1000 kernels, gms.	31.5	32.0	30.3	29.6
Damaged kernels, pct.	trace	0.3	0.0	0.03
Dark, hard, and vitreous Kernels, pct.	41.0	66.0	52.0	49.2
Ash, pct.	1.60	1.46	1.53	1.61
Protein, pct.	10.6	10.4	11.6	11.2
Fat acidity	16	11	11	11
Sedimentation value	27	29	33	34
Pearling index	27	30	28	29
Flour yield, pct.	76.0	73.8	73.7	73.2
Milling score	85.8	85.9	84.2	82.6
FLOUR:				
Ash, pct.	.44	.41	.44	.47
Protein, pct.	9.5	9.3	10.1	10.2
Mixing time, min.	2.00	1.75	2.25	2.21
Water absorption, pct.	57	58	56	57
Mixogram characteristics:				
Development time, min.	3.00	3.00	3.25	3.19
Mixing tolerance, min.	1.25	2.25	1.00	1.26
BREAD:				
Loaf volume, ml.	755	705	770	753
Expected loaf volume, ml.	680	670	710	715
Grain and texture	80	80	85	81
Crumb color	80	85	70	83

HARD RED WINTER WHEAT (cont.)

Grade	No. 2 Hard Winter				
District	Kansas City	Omaha	Omaha 1/	Wichita	Average
No. of carlots composited (Total No. 2201)	1945	159	22	75	
WHEAT:					
Test weight per bushel, lbs.	59.2	59.4	58.6	59.3	59.1
Weight per 1000 kernels, gms.	27.5	27.9	28.2	26.6	27.4
Damaged kernels, pct.	0.0	trace	1.4	trace	0.01
Dark, hard, and vitreous kernels, pct.	53.0	46.5	48.0	52.0	52.4
Ash, pct.	1.61	1.55	1.64	1.59	1.60
Protein, pct.	11.8	11.6	11.6	12.2	11.8
Fat acidity	10	16	16	13	11
Sedimentation value	36	34	32	35	36
Pearling index	31	35	35	31	31
Flour yield, pct.	73.0	74.8	75.6	73.2	73.2
Milling score	82.2	86.0	86.1	86.3	82.7
FLOUR:					
Ash, pct.	.47	.41	.44	.45	.46
Protein, pct.	11.2	10.3	10.1	11.2	11.1
Mixing time, min.	2.25	1.75	2.00	1.25	2.21
Water absorption, pct.	57	57	57	56	57
Mixogram characteristics:					
Development time, min.	3.00	3.50	3.25	3.50	3.05
Mixing tolerance, min.	1.75	1.75	2.00	1.75	1.84
BREAD:					
Loaf volume, ml.	790	735	770	773	785
Expected loaf volume, ml.	765	720	710	765	760
Grain and texture	80	85	85	85	81
Crumb color	80	70	70	75	79

1/ This composite sample graded one grade higher than its components. Such a situation can occur whenever samples which are graded down on different factors are composited.

HARD RED WINTER WHEAT (cont.)

Grade	No. 3 Hard Winter				No. 4 Hard Winter
District	Fort Worth	Kansas City	Wichita	Average	Kansas City
No. of carlots composited: (Total No. 3 HR - 535)	10	496	29		87
WHEAT:					
Test weight per bushel, lbs.	57.3	57.4	57.4	57.4	55.7
Weight per 1000 kernels, gms.	22.7	24.8	26.2	24.8	24.9
Damaged kernels, pct.	0.0	0.0	0.3	.02	0.6
Dark, hard, and vitreous kernels, pct.	74.0	63.0	58.0	62.9	52.0
Ash, pct.	1.57	1.70	1.79	1.70	1.73
Protein, pct.	13.4	13.1	13.4	13.2	13.3
Fat acidity	8	10	14	10	10
Sedimentation value	35	42	38	42	44
Pearling index	26	33	33	33	35
Flour yield, pct.	75.8	72.7	74.7	72.9	73.6
Milling score	85.0	81.0	83.6	81.2	80.4
FLOUR:					
Ash, pct.	.46	.48	.47	.48	.50
Protein, pct.	12.4	12.0	12.0	12.0	12.1
Mixing time, min.	2.25	2.50	2.00	2.47	2.25
Water absorption, pct.	59	57	59	57	57
Mixogram characteristics:					
Development time, min.	2.75	3.25	3.00	3.23	3.50
Mixing tolerance, min.	1.25	1.50	1.75	1.51	1.50
BREAD:					
Loaf volume, ml.	880	840	858	842	855
Expected loaf volume, ml.	825	805	805	805	810
Grain and texture	95	90	90	90	90
Crumb color	85	85	90	85	80

HARD RED WINTER WHEAT (cont.)

Grade	No. 1 Yellow Hard Winter				
District	Kansas City	Omaha	Peoria	Wichita	Average
No. of carlots composited (Total No. - 3357)	3171	51	71	65	
WHEAT:					
Test weight per bushel, lbs.	60.8	61.3	60.7	60.5	60.8
Weight per 1000 kernels, gms.	29.0	30.0	32.6	29.5	29.1
Damaged kernels, pct.	trace	0.4	0.8	trace	0.02
Dark, hard, and vitreous kernels, pct.	16.0	30.0	24.0	16.0	16.4
Ash, pct.	1.62	1.59	1.57	1.53	1.61
Protein, pct.	10.6	10.2	10.4	11.2	10.6
Fat acidity	10	17	13	12	10
Sedimentation value	30	25	25	30	30
Pearling index	29	29	30	32	29
Flour yield, pct.	72.7	75.1	74.6	74.4	72.8
Milling score	81.8	85.7	85.3	85.1	82.0
FLOUR:					
Ash, pct.	.48	.43	.43	.43	.46
Protein, pct.	9.6	9.0	9.0	10.0	9.6
Mixing time, min.	2.25	1.75	2.00	2.00	2.23
Water absorption, pct.	54	55	54	53	54
Mixogram characteristics:					
Development time, min.	3.75	3.50	3.00	3.75	3.72
Mixing tolerance, min.	1.75	2.00	1.75	1.50	1.74
BREAD:					
Loaf volume, ml.	733	685	680	745	732
Expected loaf volume, ml.	685	655	655	705	685
Grain and texture	85	75	75	80	85
Crumb color	75	70	85	75	75
COOKIES:					
Cooky factor	5.90	5.22	5.87	6.40	5.91

HARD RED WINTER WHEAT (cont.)

Grade	No. 2 Yellow Hard Winter						
District	Chicago	Fort Worth	Kansas City	Omaha	Peoria	Wichita	Ave.
No. carlots composited: (Total No. - 1942)	94	10	1669	35	94	40	
WHEAT:							
Test weight per bushel, lbs.	59.9	59.4	59.4	59.3	59.0	59.7	59.4
Weight per 1000 kernels, gms.	31.3	27.6	27.1	28.4	31.7	28.6	27.6
Damaged kernels, pct.	1.3	0.0	trace	trace	3.7	0.2	0.2
Dark, hard, and vitreous kernels, pct.	14.0	6.4	23.0	27.0	16.0	28.0	22.3
Ash, pct.	1.58	1.66	1.64	1.58	1.53	1.61	1.63
Protein, pct.	10.5	10.7	10.9	10.2	10.6	11.2	10.9
Fat acidity	14	11	20	17	14	11	19
Sedimentation value	25	26	30	26	27	29	29
Pearling index	33	31	30	32	30	33	30
Flour yield, pct.	76.4	75.4	73.1	74.4	73.6	74.5	73.4
Milling score	88.6	86.6	81.2	82.2	84.7	85.8	81.8
FLOUR:							
Ash, pct.	.42	.42	.48	.43	.40	.43	.47
Protein, pct.	9.4	9.7	9.9	9.1	9.2	10.1	9.8
Mixing time, min.	2.00	2.00	2.25	2.25	2.00	2.50	2.23
Water absorption, pct.	57	56	56	56	54	54	56
Mixogram characteristics:							
Development time, min.	3.25	3.75	4.00	4.25	3.25	3.50	4.05
Mixing tolerance, min.	1.75	1.50	1.50	2.50	1.75	1.75	1.55
BREAD:							
Loaf volume, ml.	750	760	758	680	695	735	753
Expected loaf volume, ml.	675	690	700	660	665	710	694
Grain and texture	85	95	90	75	75	80	89
Crumb color	75	80	90	65	85	75	88
COOKIES:							
Cooky factor	4.80	—	5.94	4.57	--	6.11	5.55

HARD RED WINTER WHEAT (cont.)

Grade	No. 3 Yellow Hard Winter			
District	Chicago	Kansas City	Peoria	Average
No. of carlots composited: (Total No. - 435)	104	226	105	
WHEAT:				
Test weight per bushel, lbs.	60.3	57.6	58.4	58.4
Weight per 1000 kernels, gms.	31.8	26.6	32.0	29.4
Damaged kernels, pct.	2.3	2.0	5.3	2.9
Dark, hard, and vitreous kernels, pct.	20.0	23.0	10.0	19.1
Ash, pct.	1.55	1.62	1.57	1.59
Protein, pct.	10.5	11.5	10.5	11.0
Fat acidity	14	15	13	15
Sedimentation value	26	34	25	30
Pearling index	32	33	31	32
Flour yield, pct.	75.6	74.2	72.6	74.1
Milling score	87.7	82.2	85.1	84.2
FLOUR:				
Ash, pct.	.42	.48	.40	.44
Protein, pct.	9.5	10.1	8.9	9.7
Mixing time, min.	2.00	2.00	2.00	2.00
Water absorption, pct.	57	54	53	54
Mixogram characteristics:				
Development time, min.	3.00	3.50	3.75	3.44
Mixing tolerance, min.	2.00	2.00	1.50	1.88
BREAD:				
Loaf volume, ml.	730	803	690	758
Expected loaf volume, ml.	680	710	650	687
Grain and texture	85	90	75	84
Crumb color	75	85	85	83
COOKIES:				
Cooky factor	5.27	5.26	5.64	5.35

HARD RED WINTER WHEAT (cont.)

Grade	No. 4 Yellow Hard Winter			No. 5 Yellow Hard Winter	Sample grade Yellow Hard Winter
District	Kansas City	Peoria	Average	Kansas City	Kansas City
No. of carlots composited: (Total No. 4 YHW - 57)	32	25		15	36
WHEAT:					
Test weight per bushel, lbs.	55.6	57.4	56.4	55.6	55.7
Weight per 1000 kernels, gms.	25.0	32.3	28.2	26.4	27.0
Damaged kernels, pct.	1.3	9.8	5.0	12.4	22.0
Dark, hard, and vitreous kernels, pct.	12.0	7.0	9.8	10.0	20.0
Ash, pct.	1.64	1.53	1.59	1.62	1.55
Protein, pct.	12.1	11.0	11.6	10.8	10.8
Fat acidity	10	15	12	9	14
Sedimentation value	37	28	33	31	30
Pearling index	37	33	35	35	35
Flour yield, pct.	72.1	74.4	73.1	72.5	72.3
Milling score	81.4	82.8	82.0	80.3	79.7
FLOUR:					
Ash, pct.	.43	.48	.45	.46	.46
Protein, pct.	10.8	9.5	10.2	9.6	9.1
Mixing time, min.	2.25	2.00	2.14	2.25	2.25
Water absorption, pct.	56	56	56	54	54
Mixogram characteristics:					
Development time, min.	4.00	3.50	3.78	4.75	4.50
Mixing tolerance, min.	2.25	2.25	2.25	1.25	2.00
BREAD:					
Loaf volume, ml.	810	755	786	710	718
Expected loaf volume, ml.	745	680	716	685	660
Grain and texture	95	85	91	80	85
Crumb color	85	75	81	75	85
COOKIES:					
Cooky factor	5.80	5.03	5.45	5.76	6.03

GSR PROJECT NO. 47 - 1958 CROP

HARD RED WINTER WHEAT - WEIGHTED AVERAGE BY SUBCLASS

Subclass	Dark Hard Winter	Hard Winter	Yellow Hard Winter
No. of carlots composited	1548	7319	5812
WHEAT:			
Test weight per bushel, lbs.	61.1	60.3	60.1
Weight per 1000 kernels, gms.	28.4	28.5	28.6
Damaged kernels, pct.	0.07	0.03	0.53
Dark, hard, and vitreous kernels, pct.	81.6	51.2	18.5
Ash, pct.	1.60	1.61	1.62
Protein, pct.	13.1	11.5	10.8
Fat acidity	11.0	10.8	13.4
Sedimentation value	40.3	34.7	29.6
Pearling index	28.9	30.1	29.9
Flour yield, pct.	74.2	73.2	73.4
Milling score	81.9	82.5	82.1
FLOUR:			
Ash, pct.	.48	.47	.46
Protein, pct.	12.1	10.6	9.7
Mixing time, min.	2.04	2.22	2.21
Water absorption, pct.	57.7	57.0	55.0
Mixogram characteristics:			
Development time, min.	2.91	3.16	3.84
Mixing tolerance, min.	1.31	1.45	1.70
BREAD:			
Loaf volume, ml.	800	771	741
Expected loaf volume, ml.	810	736	688
Grain and texture	86	82	86
Crumb color	78	82	80
COOKIES:			
Cooky factor			6.22

GSR PROJECT NO. 47 - 1958 CROP

HARD RED SPRING WHEAT

Grade	No. 1 Heavy Dark Northern Spring				
District	Denver	Duluth	Great Falls	Minneapolis	AVERAGE
No. of carlots composited (Total No. - 1431)	24	546	530	331	
WHEAT:					
Test weight per bushel, lbs.	60.7	61.3	61.1	61.4	61.2
Weight per 1000 kernels, gms.	30.7	32.3	28.0	31.9	30.5
Damaged kernels, pct.	0.5	0.2	Trace	0.2	0.1
Dark, hard and vitreous kernels, pct.	90.0	84.2	97.8	91.0	90.9
Ash, pct.	1.57	1.57	1.50	1.63	1.55
Protein, pct.	13.9	13.9	14.1	13.4	13.9
Fat acidity	8	8	9	10	9
Sedimentation value	51	56	66	55	60
Pearling index	31	30	31	32	31
Flour yield, pct.	75.3	75.9	74.3	75.3	75.2
Milling score	86.9	85.5	84.5	84.8	85.0
FLOUR:					
Ash, pct.	.42	.46	.45	.47	.46
Protein, pct.	13.6	13.0	13.1	12.6	13.0
Mixing time, min.	2.00	2.50	2.50	2.50	2.49
Water absorption, pct.	65	66	63	62	64
Mixogram characteristics:					
Development time, min.	2.50	2.75	3.00	3.25	2.95
Mixing tolerance, min.	1.50	1.50	2.00	2.00	1.80
BREAD:					
Loaf volume, ml.	890	825	813	815	819
Expected loaf volume, ml.	885	855	860	835	855
Grain and texture	90	75	90	95	85.4
Crumb color	85	70	70	75	71.4

HARD RED SPRING WHEAT (cont.)

Grade	No. 1 Dark Northern Spring				
District	Denver	Duluth	Great Falls	Minneapolis	AVERAGE
No. of carlots composited (Total No. - 518)	22	197	162	137	
WHEAT:					
Test weight per bushel, lbs.	59.4	59.4	59.4	59.2	59.3
Weight per 1000 kernels, gms.	29.9	29.5	25.0	28.7	27.8
Damaged kernels, pct.	1.4	0.3	Trace	0.3	0.25
Dark, hard and vitreous kernels, pct.	92.0	92.0	98.7	92.0	94.0
Ash, pct.	1.49	1.55	1.53	1.62	1.56
Protein, pct.	14.8	14.5	15.4	14.6	14.8
Fat acidity	9	10	10	12	11
Sedimentation value	64	62	68	65	65
Pearling index	29	32	33	32	32
Flour yield, pct.	75.4	75.9	74.5	75.1	75.2
Milling score	85.5	85.5	84.0	84.1	84.6
FLOUR:					
Ash, pct.	.44	.47	.47	.48	.47
Protein, pct.	14.0	13.3	14.5	13.4	13.7
Mixing time, min.	2.00	2.50	2.50	2.75	2.54
Water absorption, pct.	64	64	64	65	64
Mixogram characteristics:					
Development time, min.	2.50	2.75	3.25	3.50	3.30
Mixing tolerance, min.	1.25	1.50	1.75	1.75	1.64
BREAD:					
Loaf volume, ml.	925	860	905	895	886
Expected loaf volume, ml.	905	870	930	875	891
Grain and texture	90	90	90	95	91
Crumb color	80	80	75	75	77

HARD RED SPRING WHEAT (cont.)

Grade	No. 2 Dark Northern Spring				
District	Denver	Duluth	Great Falls	Minneapolis	AVERAGE
No. of carlots composited (Total No. - 815)	11	485	34	285	
WHEAT:					
Test weight per bushel, lbs.	57.5	60.5	60.7	61.0	60.6
Weight per 1000 kernels, gms.	27.5	29.8	27.4	30.8	30.0
Damaged kernels, pct.	0.4	0.2	Trace	1.2	0.54
Dark, hard and vitreous kernels, pct.	95.0	89.6	98.0	90.0	90.2
Ash, pct.	1.72	1.55	1.56	1.60	1.57
Protein, pct.	14.8	13.8	14.0	13.5	13.8
Fat acidity	9	8	10	12	9
Sedimentation value	65	60	64	53	58
Pearling index	28	30	32	32	31
Flour yield, pct.	74.1	75.6	73.5	74.6	75.1
Milling score	83.0	86.3	83.2	83.3	85.0
FLOUR:					
Ash, pct.	.46	.46	.47	.49	.47
Protein, pct.	14.1	13.1	13.1	12.6	12.9
Mixing time, min.	2.00	2.75	2.25	2.50	2.63
Water absorption, pct.	64	66	63	62	64
Mixogram characteristics:					
Development time, min.	2.50	3.00	3.25	3.25	3.10
Mixing tolerance, min.	1.50	1.50	2.00	2.25	1.78
BREAD:					
Loaf volume, ml.	860	845	830	830	839
Expected loaf volume, ml.	910	860	860	835	848
Grain and texture	90	95	90	95	95
Crumb color	75	80	75	80	80

HARD RED SPRING WHEAT (cont.)

Grade	No. 3 Dark Northern Spring					
District	Denver	Duluth	Duluth 1/	Great Falls	Minneapolis	AVERAGE
No. of carlots composited (Total No. - 258)	16	115	44	37	46	
WHEAT:						
Test weight per bushel, lbs.	56.4	60.0	59.0	61.4	56.7	59.2
Weight per 1000 kernels, gms.	25.2	30.1	30.2	28.6	23.7	28.4
Damaged kernels, pct.	0.4	0.5	0.5	Trace	0.6	0.4
Dark, hard and vitreous kernels, pct.	96.0	87.5	83.0	97.0	91.0	89.2
Ash, pct.	1.66	1.60	1.68	1.57	1.77	1.64
Protein, pct.	14.7	13.9	14.1	13.7	14.3	14.0
Fat acidity	9	8	8	10	14	10
Sedimentation value	66	62	61	63	61	62
Pearling index	29	31	32	30	32	31
Flour yield, pct.	74.5	75.5	75.3	72.8	74.1	74.8
Milling score	83.4	84.9	85.0	82.6	83.3	84.2
FLOUR:						
Ash, pct.	.47	.47	.47	.47	.49	.47
Protein, pct.	14.1	12.8	13.0	12.7	13.2	13.0
Mixing time, min.	2.00	2.50	2.50	2.50	2.75	2.51
Water absorption, pct.	66	66	65	62	61	64
Mixogram characteristics:						
Development time, min.	2.75	3.00	3.25	2.75	4.25	3.21
Mixing tolerance, min.	1.50	1.50	1.75	1.75	2.00	1.68
BREAD:						
Loaf volume, ml.	875	860	855	800	778	837
Expected loaf volume, ml.	910	845	855	840	865	855
Grain and texture	90	80	90	85	90	84
Crumb color	75	70	80	75	85	75

1/ This composite sample graded one grade higher than its components. Such a situation can occur whenever samples which are graded down on different factors are composited.

HARD RED SPRING WHEAT (cont.)

Grade	No. 4 Dark Northern Spring	No. 1 Heavy Northern Spring	No. 1 Northern Spring		
District	Minneapolis	Duluth	Duluth	Minneapolis	AVERAGE
No. of carlots composited (Total No. 1 NS - 98)	16	34	65	33	
WHEAT:					
Test weight per bushel, lbs.	54.3	61.5	59.0	59.0	59.0
Weight per 1000 kernels, gms.	23.5	34.3	33.0	31.4	32.4
Damaged kernels, pct.	2.3	0.1	0.2	0.6	0.3
Dark, hard and vitreous kernels, pct.	81.5	69.0	59.1	71.0	63.1
Ash, pct.	1.80	1.71	1.61	1.62	1.61
Protein, pct.	13.1	11.7	12.9	12.9	12.9
Fat acidity	18	8	8	13	9
Sedimentation value	57	41	48	47	48
Pearling index	31	30	34	32	34
Flour yield, pct.	74.6	76.7	76.4	76.2	76.4
Milling score	82.5	86.3	86.5	85.5	86.1
FLOUR:					
Ash, pct.	.50	.48	.47	.48	.47
Protein, pct.	12.3	10.8	12.0	12.1	12.1
Mixing time, min.	2.75	2.75	2.25	2.75	2.42
Water absorption, pct.	59	65	63	61	62
Mixogram characteristics:					
Development time, min.	5.00	3.50	3.50	3.50	3.50
Mixing tolerance, min.	4.25	3.00	1.75	3.00	2.17
BREAD:					
Loaf volume, ml.	745	770	790	755	778
Expected loaf volume, ml.	820	745	805	810	810
Grain and texture	90	85	90	90	90
Crumb color	80	70	75	80	77

HARD RED SPRING WHEAT (cont.)

Grade	No. 2 Northern Spring				No. 4 Northern Spring
District	Duluth	Duluth 1/	Minneapolis	AVERAGE	Duluth
No. of carlots composited (Total No. 2 NS - 167)	76	35	56		20
WHEAT:					
Test weight per bushel, lbs.	59.3	57.5	59.8	59.1	57.3
Weight per 1000 kernels, gms.	32.4	31.2	33.2	32.4	29.5
Damaged kernels, pct.	0.5	0.8	0.7	0.6	2.2
Dark, hard and vitreous kernels, pct.	58.0	54.8	73.0	62.4	57.5
Ash, pct.	1.59	1.60	1.72	1.63	1.62
Protein, pct.	12.4	13.0	12.7	12.6	13.7
Fat acidity	8	8	15	10	9
Sedimentation value	46	49	41	45	59
Pearling index	32	33	33	33	33
Flour yield, pct.	76.4	76.0	75.3	75.9	75.0
Milling score	86.7	86.1	82.7	85.2	84.5
FLOUR:					
Ash, pct.	.46	.47	.52	.48	.48
Protein, pct.	11.7	11.9	11.9	11.8	12.5
Mixing time, min.	2.50	2.75	2.75	2.57	2.50
Water absorption, pct.	64	62	62	63	64
Mixogram characteristics:					
Development time, min.	3.75	3.75	3.50	3.66	3.75
Mixing tolerance, min.	2.75	2.00	2.50	2.25	2.50
BREAD:					
Loaf volume, ml.	775	830	733	778	860
Expected loaf volume, ml.	790	800	800	794	830
Grain and texture	100	95	90	95	90
Crumb color	75	70	80	75	75

1/ This composite sample graded one grade higher than its components. Such a situation can occur whenever samples which are graded down on different factors are composited.

GSR PROJECT NO. 47 - 1958 CROP

HARD RED SPRING WHEAT - WEIGHTED AVERAGE BY SUBCLASS

Subclass	Dark Northern Spring	Northern Spring
No. of carlots composited	3038	319
WHEAT:		
Test weight per bushel, lbs.	60.5	59.2
Weight per 1000 kernels, gms.	29.7	32.4
Damaged kernels, pct.	0.30	0.60
Dark, hard, and vitreous kernels, pct.	91.0	63.0
Ash, pct.	1.53	1.63
Protein, pct.	14.0	12.7
Fat acidity	9.4	9.6
Sedimentation value	60	46
Pearling index	31	33
Flour yield, pct.	75.1	76.0
Milling score	84.8	85.6
FLOUR:		
Ash, pct.	.47	.48
Protein, pct.	13.0	11.8
Mixing time	2.57	2.54
Water absorption, pct.	64.1	63.0
Mixogram characteristics:		
Development time, min.	3.05	3.60
Mixing tolerance, min.	1.77	2.45
BREAD:		
Loaf volume, ml.	837	779
Expected loaf volume, ml.	855	795
Grain and texture	89	92
Crumb color	75	78

GSR PROJECT NO. 47 - 1958 CROP

SOFT RED WINTER WHEAT 1/

Grade	No. 1 Red Winter				No. 1 Red Winter Lt.Garlicky	No. 1 Red Winter Garlicky
District	Buffalo	Indianapolis	Toledo	Ave.	Philadelphia	Baltimore
No. of carlots composited (Total No. 1 RW - 151)	68	18	65		111	86
WHEAT:						
Test weight per bushel, lbs.	60.4	60.2	60.5	60.4	60.8	60.2
Weight per 1000 kernels, gms.	40.3	30.0	38.7	38.4	40.0	36.0
Damaged kernels, pct.	1.0	0.2	1.5	1.1	0.9	0.4
Ash, pct.	1.53	1.67	1.53	1.54	1.57	1.64
Protein, pct.	9.9	9.6	10.0	9.9	9.6	9.3
Fat acidity	14	16	13	14	23	11
Sedimentation value	12	10	11	11	10	11
Pearling index	41	44	41	41	42	38
Flour yield, pct.	71.6	69.7	71.8	71.5	72.8	72.7
Milling score	81.3	78.1	81.4	81.0	83.3	82.0
FLOUR:						
Ash, pct.	.41	.40	.40	.40	.41	.42
Protein, pct.	8.4	8.1	8.4	8.4	7.9	8.0
Mixing time, min.	1.75	2.00	1.75	1.78	1.50	1.50
Water absorption, pct.	54	50	53	53	53	53
BREAD:						
Loaf volume, ml.	703	670	638	671	628	665
Expected loaf volume, ml.	635	610	625	623	600	605
Grain and texture	75	75	70	73	60	70
Crumb color	65	75	70	68	65	70
COOKIES:						
Cooky factor	5.51	6.26	5.63	5.70	5.77	5.95

1/ Two samples from Louisville were lost in transit.

SOFT RED WINTER WHEAT (cont.)

Grade	No. 2 Red Winter				
District	Buffalo	Indianapolis	Louisville	Toledo	Average
No. of carlots composited (Total No. - 229)	112	46	41	30	
WHEAT:					
Test weight per bushel, lbs.	59.2	58.7	59.4	59.5	59.2
Weight per 1000 kernels, gms.	37.9	33.8	31.9	39.6	36.2
Damaged kernels, pct.	2.5	2.0	2.5	2.0	2.3
Ash, pct.	1.60	1.63	1.62	1.58	1.60
Protein, pct.	10.0	10.1	9.9	9.8	10.0
Fat acidity	14	27	15	14	17
Sedimentation value	11	11	10	11	11
Pearling index	44	44	50	41	44
Flour yield, pct.	70.9	72.6	70.8	70.6	71.2
Milling score	82.1	81.7	80.6	79.8	81.4
FLOUR:					
Ash, pct.	.38	.41	.38	.40	.39
Protein, pct.	8.4	8.5	8.3	8.3	8.4
Mixing time, min.	1.75	2.00	2.00	1.75	1.92
Water absorption, pct.	54	51	53	52	53
BREAD:					
Loaf volume, ml.	633	683	695	650	656
Expected loaf volume	625	630	620	620	626
Grain and texture	70	70	70	65	69
Crumb color	70	75	70	70	70
COOKIES:					
Cooky factor	5.48	5.83	6.14	5.42	5.65

SOFT RED WINTER WHEAT (cont.)

Grade	No. 2 Red Winter, Garlicky		
District	Baltimore	Philadelphia	Average
No. of carlots composited (Total No. - 403)	95	308	
WHEAT:			
Test weight per bushel, lbs.	59.0	59.4	59.3
Weight per 1000 kernels, gms.	34.8	42.5	40.9
Damaged kernels, pct.	0.6	1.1	1.0
Ash, pct.	1.64	1.57	1.58
Protein, pct.	9.4	9.0	9.1
Fat acidity	18	22	20
Sedimentation value	11	8	9
Pearling index	39	45	43
Flour yield, pct.	71.5	73.0	72.3
Milling score	80.3	82.2	81.7
FLOUR:			
Ash, pct.	.41	.41	.41
Protein, pct.	8.0	7.2	7.4
Mixing time, min.	1.50	1.50	1.50
Water absorption, pct.	51	54	53
BREAD:			
Loaf volume, ml.	625	620	621
Expected loaf volume	605	565	576
Grain and texture	70	70	70
Crumb color	70	70	70
COOKIES:			
Cooky factor	5.93	5.74	5.78

SOFT RED WINTER WHEAT (cont.)

Grade	No. 3 Red Winter			No. 3 Red Winter, Garlicky		
District	Buffalo	Indianapolis	AVERAGE	Baltimore	Philadelphia	AVERAGE
No. of carlots composited (Total No.: 3 RW - 107) 3 RW Gar. - 198)	60	47		52	146	
WHEAT:						
Test weight per bushel, lbs.	57.1	57.6	57.3	56.8	57.7	57.5
Weight per 1000 kernels, gms.	37.2	33.6	35.6	35.6	37.2	36.7
Damaged kernels, pct.	5.2	4.0	4.7	0.5	0.7	0.6
Ash, pct.	1.57	1.59	1.58	1.64	1.62	1.62
Protein, pct.	9.8	10.2	10.0	9.4	9.2	9.2
Fat acidity	14	20	17	9	23	19
Sedimentation value	9	11	10	10	10	10
Pearling index	45	44	45	44	47	46
Flour yield, pct.	71.9	72.1	72.0	72.3	73.6	73.2
Milling score	83.0	81.9	82.5	83.5	83.3	83.3
FLOUR:						
Ash, pct.	.37	.39	.38	.39	.40	.40
Protein, pct.	8.0	8.4	8.1	7.8	7.7	7.7
Mixing time, min.	1.25	1.75	1.47	1.50	1.50	1.50
Water absorption, pct.	53	52	53	51	52	52
BREAD:						
Loaf volume, ml.	665	680	672	650	645	646
Expected loaf volume, ml.	605	625	613	595	590	592
Grain and texture	80	75	78	80	75	76
Crumb color	75	75	75	70	70	70
COOKIES:						
Cooky factor	5.50	5.99	5.71	5.99	5.85	5.88

SOFT RED WINTER WHEAT (cont.)

Grade	No. 5 Red Winter	Sample Grade Red Winter
District	Indianapolis 1/	Indianapolis 1/
No. of carlots composited	15	16
WHEAT:		
Test weight per bushel, lbs.	57.0	56.4
Weight per 1000 kernels, gms.	33.1	33.5
Damaged kernels, pct.	12.0	17.0
Ash, pct.	1.57	1.58
Protein, pct.	10.0	10.4
Fat acidity	21	24
Sedimentation value	11	13
Pearling index	48	50
Flour yield, pct.	73.2	73.2
Milling score	83.0	80.1
FLOUR:		
Ash, pct.	.39	.45
Protein, pct.	8.3	8.7
Mixing time, min.	1.75	1.75
Water absorption, pct.	52	52
BREAD:		
Loaf volume, ml.	660	693
Expected loaf volume, ml.	620	640
Grain and texture	70	65
Crumb color	70	65
COOKIES:		
Cooky factor	5.96	6.16

1/ Downgraded on account of total damage.

GSR PROJECT NO. 47 - 1958 CROP

SOFT RED WINTER WHEAT - WEIGHTED AVERAGE BY SUBCLASS

Subclass	Red Winter
No. of carlots composited	1316
WHEAT:	
Test weight per bushel, lbs.	59.1
Weight per 1000 kernels, gms.	38.0
Damaged kernels, pct.	1.8
Ash, pct.	1.57
Protein, pct.	10.0
Fat acidity	17.2
Sedimentation value	10.0
Pearling index	43.5
Flour yield, pct.	72.4
Milling score	82.0
FLOUR:	
Ash, pct.	.40
Protein, pct.	7.9
Mixing time, min.	1.61
Water absorption, pct.	52.6
BREAD:	
Loaf volume, ml.	646
Expected loaf volume, ml.	601
Grain and texture	70.7
Crumb color	69.8
COOKIES:	
Cookie factor	5.77

GSR PROJECT NO. 47 - 1958 CROP

WHITE WHEAT

Grade	No. 1 Hard White	No. 1 Soft White			
District	Portland	Portland	Spokane	Toledo	AVERAGE
No. of carlots composited (Total No. - 419)	20	300	94	25	
WHEAT:					
Test weight per bushel, lbs.	60.3	61.1	61.6	61.0	61.2
Weight per 1000 kernels, gms.	37.3	33.6	36.7	39.8	34.7
Damaged kernels, pct.	0.1	0.0	0.7	0.5	0.2
Hard kernels, pct.	93.0	49.0	15.0	13.0	39.2
Ash, pct.	1.70	1.58	1.52	1.38	1.55
Protein, pct.	11.7	9.5	8.8	9.0	9.3
Fat acidity	9	11	11	16	11
Sedimentation value	36	11	10	7	10
Pearling index	39	41	43	44	42
Flour yield, pct.	69.6	74.1	72.9	74.9	73.9
Milling score	76.2	81.4	82.6	83.3	81.8
FLOUR:					
Ash, pct.	.46	.46	.42	.46	.46
Protein, pct.	10.2	8.1	7.4	8.1	8.0
Mixing time, min.	2.25	1.75	2.00	1.75	1.81
Water absorption, pct.	56	53	54	50	53
BREAD:					
Loaf volume, ml.	735	660	638	608	652
Expected loaf volume, ml.	715	610	575	610	604
Grain and texture	95	65	65	65	65
Crumb color	85	70	70	65	70
COOKIES:					
Cooky factor	5.64	6.28	5.96	5.88	6.18

WHITE WHEAT (cont.)

Grade	No. 2 Soft White				
District	Buffalo	Portland	Spokane	Toledo	AVERAGE
No. of carlots composited (Total No. - 356)	72	224	25	35	
WHEAT:					
Test weight per bushel, lbs.	58.9	59.0	59.5	59.3	59.0
Weight per 1000 kernels, gms.	30.4	33.8	31.5	38.7	33.4
Damaged kernels, pct.	1.7	0.2	0.2	2.0	0.7
Hard kernels, pct.	19.1	57.0	14.0	15.0	43.0
Ash, pct.	1.55	1.64	1.60	1.44	1.59
Protein, pct.	9.1	10.0	9.3	9.3	9.7
Fat acidity	15	11	11	16	12
Sedimentation value	6	11	11	7	10
Pearling index	46	42	45	45	43
Flour yield, pct.	73.9	74.9	72.4	73.3	74.4
Milling score	82.4	82.4	79.9	82.6	82.2
FLOUR:					
Ash, pct.	.44	.48	.44	.44	.46
Protein, pct.	7.8	8.6	7.8	8.1	8.3
Mixing time, min.	1.75	2.00	2.00	2.00	1.95
Water absorption, pct.	53	59	52	51	57
BREAD:					
Loaf volume, ml.	615	668	653	660	655
Expected loaf volume, ml.	595	635	595	610	622
Grain and texture	55	70	70	75	67
Crumb color	60	70	70	65	67
COOKIES:					
Cooky factor	5.76	5.21	5.47	5.27	5.34

WHITE WHEAT (cont.)

Grade	No. 3 Soft White				No. 4 Soft White	No. 5 Soft White
District	Buffalo	Portland	Spokane	AVERAGE	Spokane	Spokane
No. of carlots composited (Total No. 3 SW - 160)	31	114	15		9	7
WHEAT:						
Test weight per bushel, lbs.	57.4	57.5	57.6	57.5	55.3	52.8
Weight per 1000 kernels, gms.	37.2	33.5	25.1	33.4	21.7	19.5
Damaged kernels, pct.	1.4	0.3	0.1	0.6	0.0	0.0
Hard kernels, pct.	3.3	45.1	23.0	34.9	16.0	34.0
Ash, pct.	1.61	1.69	1.67	1.67	1.72	1.77
Protein, pct.	8.7	10.0	9.0	9.7	8.9	8.8
Fat acidity	15	11	12	12	11	13
Sedimentation value	5	11	10	10	5	5
Pearling index	49	44	46	46	47	44
Flour yield, pct.	74.4	74.5	71.8	74.2	70.6	71.1
Milling score	81.4	82.0	82.2	81.9	83.8	81.8
FLOUR:						
Ash, pct.	.46	.48	.40	.47	.36	.38
Protein, pct.	7.4	8.4	7.8	8.1	7.7	7.7
Mixing time, min.	1.75	2.00	2.00	1.95	2.00	1.75
Water absorption, pct.	51	59	50	57	51	52
BREAD:						
Loaf volume, ml.	603	670	668	657	685	633
Expected loaf volume, ml.	575	625	595	612	590	590
Grain and texture	65	75	70	73	70	60
Crumb color	65	75	65	72	65	55
COOKIES:						
Cooky factor	6.23	5.16	5.78	5.42	6.21	6.00

WHITE WHEAT (cont.)

Grade	No. 1 White Club			No. 2 White Club			No. 3 White Club
District	Portland	Spokane	AVERAGE	Portland	Spokane	AVERAGE	Spokane
No. of carlots composited (Total - No. 1 WC - 479 No. 2 WC - 189)	398	81		144	45		9
WHEAT:							
Test weight per bushel, lbs.	60.6	61.0	60.7	59.8	59.5	59.7	57.5
Weight per 1000 kernels, gms.	31.0	31.6	31.1	30.1	30.3	30.1	28.0
Damaged kernels, pct.	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Hard kernels, pct.	9.5	10.6	9.7	13.5	10.0	12.6	9.6
Ash, pct.	1.46	1.54	1.47	1.43	1.57	1.46	1.61
Protein, pct.	8.1	8.3	8.1	7.8	8.1	7.8	8.4
Fat acidity	9	10	9	9	11	10	9
Sedimentation value	8	8	8	4	5	4	5
Pearling index	48	46	48	53	44	50	54
Flour yield, pct.	76.8	77.3	77.0	76.2	78.0	76.6	74.1
Milling score	88.0	87.9	88.1	87.9	88.6	88.1	84.8
FLOUR:							
Ash, pct.	.42	.43	.42	.42	.43	.42	.42
Protein, pct.	6.8	7.1	6.9	6.5	6.8	6.5	7.3
Mixing time, min.	1.75	1.25	1.66	1.75	1.25	1.63	1.25
Water absorption, pct.	54	54	54	53	52	53	52
BREAD:							
Loaf volume, ml.	578	565	577	585	558	578	565
Expected loaf volume, ml.	545	560	549	530	545	532	570
Grain and texture	60	55	59	60	55	59	60
Crumb color	60	65	61	65	60	64	60
COOKIES:							
Cooky factor	6.16	5.46	6.05	6.20	5.96	6.14	5.37

WHITE WHEAT (cont.)

Grade	No. 1 Western White	No. 2 Western White
District	Portland	Portland
No. of carlots composited	219	176
WHEAT:		
Test weight per bushel, lbs.	61.0	59.8
Weight per 1000 kernels, gms.	29.1	30.7
Damaged kernels, pct.	0.0	0.0
Hard kernels, pct.	33.5	23.6
Ash, pct.	1.48	1.50
Protein, pct.	8.7	8.3
Fat acidity	9	9
Sedimentation value	7	6
Pearling index	44	47
Flour yield, pct.	76.6	76.5
Milling score	86.6	86.5
FLOUR:		
Ash, pct.	.45	.45
Protein, pct.	7.3	7.1
Mixing time, min.	1.75	1.75
Water absorption, pct.	54	53
BREAD:		
Loaf volume, ml.	628	593
Expected loaf volume, ml.	570	560
Grain and texture	70	55
Crumb color	75	65
COOKIES:		
Cooky factor	6.03	6.17

GSR PROJECT NO. 47 - 1958 CROP

WHITE WHEAT - WEIGHTED AVERAGE BY SUBCLASS [1/]

Subclass	Soft White	White Club	Western White
No. of carlots composited	951	677	395
WHEAT:			
Test weight per bushel, lbs.	58.6	60.4	60.5
Weight per 1000 kernels, gms.	33.6	30.8	29.8
Damaged kernels, pct.	0.40	0.00	0.00
Hard kernels, pct.	39.7	10.5	29.1
Ash, pct.	1.59	1.47	1.49
Protein, pct.	9.5	8.0	8.5
Fat acidity	13.1	9.4	9.1
Sedimentation value	9.8	6.9	6.5
Pearling index	39.8	48.8	45.3
Flour yield, pct.	74.1	76.8	76.5
Milling score	82.0	88.1	86.5
FLOUR:			
Ash, pct.	.46	.42	.45
Protein, pct.	8.1	6.8	7.2
Mixing time, min.	1.88	1.64	1.75
Water absorption, pct.	54.9	55.7	54
BREAD:			
Loaf volume, ml.	654	577	612
Expected loaf volume, ml.	610	545	565
Grain and texture	67	59	63
Crumb color	69	62	70
COOKIES:			
Cooky factor	5.73	6.07	6.09

1/ Only one sample of Hard White Wheat was submitted. An average, therefore, is not necessary.

GSR PROJECT NO. 47 - 1958 CROP

DURUM WHEAT

Grade	No. 1 Hard Amber Durum			No. 2 Hard Amber Durum		
District	Duluth	Minneapolis	AVERAGE	Duluth	Minneapolis	AVERAGE
No. of carlots composited (Totals: No. 1 Hd.Amber Durum, 70) No. 2 Hd.Amber Durum, 69)	25	45		38	31	
WHEAT:						
Test weight per bushel, lbs.	62.8	62.6	62.7	62.5	62.8	62.6
Weight per 1000 kernels, gms.	39.4	39.7	39.6	38.2	37.8	38.0
Damaged kernels, pct.	0.2	0.6	0.4	0.9	0.8	0.9
Hard and vitreous kernels of amber color, pct.	88.0	80.0	82.8	83.5	83.0	83.3
Ash, pct.	1.47	1.37	1.40	1.48	1.70	1.56
Protein, pct.	12.1	13.7	13.2	12.6	12.1	12.4
Fat acidity	8	10	9	8	9	9
Pearling index	29	29	29	30	31	30
Semolina yield, pct.	58.0	59.5	58.9	58.3	60.9	59.4
Carotenoid content, p.p.m.	6.1	6.1	6.1	6.0	6.2	6.1
SEMOLINA:						
Ash, pct.	.65	.67	.66	.66	.68	.67
Protein, pct.	11.6	12.2	12.0	12.1	11.4	11.8
Carotenoid content, p.p.m.	5.6	5.5	5.5	5.4	5.5	5.4
MACARONI:						
Visual appearance	Clear deep yellow	Clear Yellow		Clear Yellow	Clear Yellow	
Numerical rating	1	2	1.5	2	2	2

DURUM WHEAT (cont.)

Grade	No. 3 Hard Amber Durum			No. 4 Hard Amber Durum		
District	Duluth	Minneapolis	AVERAGE	Duluth	Minneapolis	AVERAGE
No. of carlots composited (Totals: 3 Hard Amber Durum - 192 4 Hard Amber Durum - 67)	115	77		29	38	
WHEAT:						
Test weight per bushel, lbs.	62.5	62.2	62.4	61.8	61.6	61.7
Weight per 1000 kernels, gms.	38.4	34.9	37.0	39.0	39.1	39.0
Damaged kernels, pct.	0.5	0.9	0.7	1.1	2.0	1.6
Hard and vitreous kernels of amber color, pct.	84.2	85.0	84.5	88.7	85.0	86.6
Ash, pct.	1.51	1.51	1.51	1.48	1.52	1.51
Protein, pct.	12.8	13.3	13.0	13.7	13.3	13.5
Fat acidity	9	11	10	8	11	10
Pearling index	30	29	30	31	29	30
Semolina yield, pct.	58.6	60.7	59.4	57.3	57.8	57.6
Carotenoid content, p.p.m.	5.9	6.1	6.0	6.3	5.9	6.1
SEMOLINA:						
Ash, pct.	.65	.66	.65	.63	.63	.63
Protein, pct.	12.2	12.5	12.3	12.9	12.6	12.7
Carotenoid content, p.p.m.	5.4	5.4	5.4	5.3	5.2	5.2
MACARONI:						
Visual appearance	Clear deep yellow	Pale yellow		Clear Yellow	Clear Yellow	
Numerical rating	1	3	2.0	2	2	2

DURUM WHEAT

Grade	No. 1 Amber Durum	No. 2 Amber Durum	No. 3 Amber Durum	No. 5 Amber Durum
District	Duluth	Duluth	Duluth	Minneapolis
No. of carlots composited	27	29	83	16
WHEAT:				
Test weight per bushel, lbs.	62.5	62.0	62.2	60.0
Weight per 1000 kernels, gms.	37.0	37.6	39.6	33.2
Damaged kernels, pct.	0.5	0.8	1.4	11.9
Hard and vitreous kernels of amber color, pct.	65.3	66.0	68.6	70.0
Ash, pct.	1.46	1.52	1.50	1.55
Protein, pct.	12.2	12.2	12.5	13.4
Fat acidity	9	9	10	13
Pearling index	30	31	31	32
Semolina yield, pct.	59.5	58.3	57.7	52.9
Carotenoid content, p.p.m.	6.2	6.1	6.0	5.6
SEMOLINA:				
Ash, pct.	.68	.67	.67	.64
Protein, pct.	11.6	11.7	11.9	12.4
Carotenoid content, p.p.m.	5.5	5.5	5.3	5.1
MACARONI:				
Visual appearance	Pale yellow	Pale yellow	Pale yellow	Clear yellow
Numerical rating	3	3	3	2

DURUM WHEAT

Grade	No. 1 Durum	No. 3 Durum
District	Duluth	Duluth
No. of carlots composited	33	29
WHEAT:		
Test weight per bushel, lbs.	62.2	60.7
Weight per 1000 kernels, gms.	37.7	39.6
Damaged kernels, pct.	0.8	1.8
Hard and vitreous kernels of amber color, pct.	51.1	56.2
Ash, pct.	1.42	1.51
Protein, pct.	11.4	11.7
Fat acidity	8	8
Pearling index	32	34
Semolina yield, pct.	56.1	55.8
Carotenoid content, p.p.m.	5.9	5.9
SEMOLINA:		
Ash, pct.	.69	.66
Protein, pct.	10.9	11.1
Carotenoid content, p.p.m.	5.5	5.3
MACARONI:		
Visual appearance	Pale yellow	Clear yellow
Numerical rating	3	2

GSR PROJECT NO. 47 - 1958 CROP

DURUM WHEAT - WEIGHTED AVERAGE BY SUBCLASS

Subclass	Hard Amber Durum	Amber Durum	Durum
No. of carlots composited	398	155	62
WHEAT:			
Test weight per bushel, lbs.	62.3	61.9	61.4
Weight per 1000 kernels, gms.	38.0	38.1	38.5
Damaged kernels, pct.	.82	2.20	1.60
Hard and vitreous kernels of amber color, pct.	83.9	67.7	53.5
Ash, pct.	1.50	1.50	1.46
Protein, pct.	12.9	12.5	11.5
Fat acidity	9.4	9.8	7.9
Pearling index	29.6	30.9	32.9
Semolina yield, pct.	59.1	57.8	56.0
Carotenoid content, p.p.m.	6.0	6.0	5.9
SEMOLINA:			
Ash, pct.	.65	.66	.68
Protein, pct.	12.2	11.9	11.0
Carotenoid content, p.p.m.	5.4	5.4	5.4
MACARONI:			
Numerical rating	1.8	2.9	2.5

CONCLUSIONS

The 1958 hard red winter and hard red spring wheat crops were significantly higher in test weight and weight per 1000 kernels than the 1957 crops. Average differences were 1.3 pounds and 2.6 grams for the winter wheat and 2.3 pounds and 5.0 grams for the spring wheats. These values were not reflected in a better milling score except for the spring wheat. Differences in protein content, sedimentation value, and loaf volume for winter wheat for the two years were not significant. However, in the case of the spring wheat the protein content was 1.0 percent lower, sedimentation value 5.5 ml. lower, milling score 3.2 higher, and loaf volume 109 ml. lower than the 1957 crop.

Soft red winter and white wheat test weights were about the same for both years. Likewise, all other quality values were not significantly different for the two years, except that the weight per 1000 kernels of soft red winter wheat was 4.5 grams higher in 1958, and the milling score for white wheat was 5.7 higher in 1958.

Durum wheat of the 1958 crop was 3.9 grams greater in weight per 1000 kernels than the 1957 wheat. It also gave better semolina yields to the extent of 10.3 percent. Macaroni made from the durum wheat of the subclass Hard Amber Durum Wheat of 1958 was greatly superior in color to that made from the 1957 wheat. This was not so in the other subclasses.

A tabulation of weighted averages for certain physical, chemical, milling, and baking characteristics as well as macaroni making quality of durum wheat of the 1957 and 1958 wheat crops, by subclass is given in Table 1.

TABLE 1 - COMPARISON OF 1957AND 1958 CROP WHEAT BY SUBCLASS (AVERAGE VALUES)

	HARD RED WINTER WHEAT						HARD RED SPRING WHEAT			
	Dark Hard Winter		Hard Winter		Yellow Hard Winter		Dark Northern Spring		Northern Spring	
	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958
Test weight per bushel, lbs.	59.9	61.1	59.4	60.3	58.4	60.1	58.2	60.5	56.9	59.2
Weight per 1000 kernels, gms.	26.1	28.4	25.1	28.5	26.4	28.6	24.7	29.7	27.6	32.4
Protein (wheat), %	12.6	13.1	12.2	11.5	11.1	10.8	14.9	14.0	13.7	12.7
Sedimentation value (wheat) ml.	39	40	39	35	30	30	65	60	52	46
Milling score	82.6	81.9	85.8	82.5	83.8	82.1	81.4	84.8	82.7	85.6
Bread loaf volume, ml.	756	800	748	771	728	741	938	837	897	779

	SOFT RED WINTER WHEAT		WHITE WHEAT						DURUM WHEAT					
	Red Winter		Soft White		White Club		Western White		Hard Amber Durum		Amber Durum		Durum	
	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958	1957	1958
Test weight per bushel, lbs.	58.7	59.1	59.4	58.6	60.7	60.4	60.7	60.5	61.8	62.3	61.5	61.9	60.6	61.4
Weight per 1000 kernels, gms.	33.5	38.0	33.3	33.6	31.3	30.8	31.5	29.8	34.4	38.0	34.0	38.1	34.3	38.5
Protein (wheat), %	10.4	10.0	9.2	9.5	8.9	8.0	8.8	8.5	13.7	12.9	12.2	12.5	12.0	11.5
Milling score	80.7	82.0	77.9	82.0	81.4	88.1	80.2	86.5						
Bread loaf volume, ml.	648	646	637	654	556	577	587	612						
Cooky factor	5.78	5.77	5.68	5.73	5.65	6.07	5.80	6.09						
Semolina yield									46.2	59.1	48.6	57.8	47.1	56.0
Numerical rating									5.4	1.8	2.9	2.9	2.9	2.5